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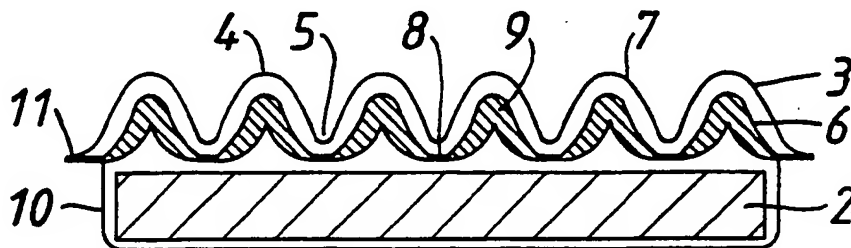
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**(54) Title:** HYGIENIC ABSORBENT PRODUCTS**(57) Abstract**

A hygienic absorbent product includes an absorbent layer and a liquid pervious substantially non-absorbent, longitudinal ribbed distribution member adjacent to the body facing side of the absorbent layer. The ribs of the distribution member comprise a lofty non-woven fabric and may be in the form of unitary corrugated layer or strips of lofty non-woven fabric under the raised portions of a corrugated liquid top cover.

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HYGIENIC ABSORBENT PRODUCTS

The present invention relates to hygienic absorbent products and in particular hygienic absorbent products suitable for coping with rapid discharges of body fluid and process for their preparation.

Conventional hygienic absorbent products such as incontinence pads, sanitary towels, diapers and alike products normally comprise an absorbent layer and a liquid pervious cover layer on the body facing side of the absorbent layer. These conventional products although suitable for coping with normal discharges of body fluid have been found to be unsuitable for use in coping with the rapid discharges of body fluid such as urine which for example are associated with female stress incontinence. Such rapid discharges of urine, which it is believed can be delivered at a rate of up to 20ml/sec., normally exceeds the rate at which urine can be absorbed by the localised surface of the conventional product which is adjacent to the vagina. As a consequence, the excess urine from these rapid discharges tends to flood the localised surface and spread rapidly to the sides of the product to cause leakage therefrom. It has also been found that the

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body facing surface of a conventional planar hygienic absorbent product tends to form transverse creases when it is made to conform with the perineal area of the body which further promotes transverse spreading of urine to the sides of the absorbent product.

Furthermore, the absorbent urine in such conventional hygienic absorbent products tends to "wet-back" through the cover layer of the product causing the surface of the product in use to feel damp and uncomfortable.

We have found that for an absorbent pad to be able to cope with rapid discharges of fluid such as urine it is desirable to provide the absorbent pad with a cover layer which (a) provides a temporary reservoir, (b) is capable of allowing rapid transmission of fluid into absorbent pad and (c) is capable of distributing the fluid preferentially along longitudinal surface of the pad. United Kingdom Patent No. 2023067 discloses a disposable product comprising a liquid pervious cover or top sheet of hydrophobic fibres which has a ribbed pattern bonded at lines to an absorbent pad. The lines of bonding are stated to perform two functions, in addition to stabilising the construction of the product, firstly, they form 'gutters' to enable the fluid to pass through into the absorbent pad. The main bulk of the sheet does not provide a temporary reservoir for the fluid. Fluid transfer across the

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surface of the product will be over the surface.

United Kingdom Patent No. 2145120 discloses an absorbent product having a liquid permeable facing covering an absorbent layer which comprises a bulky corrugated fibrous layer containing to provide the product with a large absorbent capacity. The cover facing or layer taught by this patent is a conventional planar sheet layer.

Hygienic absorbent products have now been found which are suitable for coping with rapid discharges of body fluids such as urine and which have improved comfort and reduced "wet-back" properties when compared with conventional hygienic products.

The present invention provides a hygienic absorbent product including an absorbent layer and a liquid pervious, substantially non-absorbent, longitudinally ribbed liquid distribution member adjacent the body facing side of the absorbent layer, wherein the ribs of the distribution member comprise a lofty non-woven fabric.

The longitudinally ribbed liquid distribution member provides the absorbent layer of the product of the invention with a liquid pervious cover layer which

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has longitudinal raised portions and longitudinal depressed portions. The interstices between the fibres in this cover layer, provide a temporary reservoir and thereby permit the fluid to readily transfer across to other regions of the underlying absorbent layer. The ribbed member can conveniently comprise a corrugated layer. In preferred aspects of the invention therefore the lofty non-woven fabric of the cover layer is either in the form of a corrugated layer or in the form of strips under a corrugated top sheet.

In another aspect therefore the present invention provides a hygienic absorbent product which comprises an absorbent layer and a non-absorbent liquid pervious cover layer on the body facing side of the absorbent layer wherein the cover layer comprises a longitudinal corrugated layer of lofty non-woven fabric.

In a further aspect therefore the present invention provides a hygienic absorbent product which comprises an absorbent layer and a non-absorbent liquid pervious cover layer on the body facing side of the absorbent layer wherein the cover layer has longitudinal raised portions separated by longitudinal depressed portions and comprises a longitudinal corrugated liquid pervious top sheet and strips of lofty non-woven fabric positioned under the top sheet and



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within the longitudinal raised portions of the cover layer.

It has been found that the cover layer of the hygienic absorbent product of the invention, in addition to allowing rapid penetration of body fluid into the absorbent layer, can promote the spread of body fluid in the longitudinal direction of the product, can inhibit the spread of body fluid in the transverse direction thereof and can also provide a temporary reservoir for excess body fluid. The cover layer of hygienic absorbent products of the invention thus possesses fluid distribution, leakage prevention and temporary means for excess fluid which are not present in the cover layer of conventional hygienic absorbent products and which render hygienic absorbent products of the invention capable of coping with rapid discharges of body fluid such as urine. Furthermore the increased thickness of such a cover layer over that of conventional hygienic absorbent products reduces the amount of wet-back of absorbent fluid from the absorbent layer through the cover layer thereby rendering hygienic absorbent product of the invention more comfortable to wear.

A "lofty" non-woven fabric is a non-woven fabric which is open and resilient and has a large volume of a

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given mass. Such "lofty" non-woven fabrics have a bulk density of less than 0.1g/cc and a thickness of greater than 1.5mm.

The lofty non-woven fabric used in the invention is preferably bonded fibre fabric such as a thermally bonded fabric. Such thermally bonded fabrics can be formed by heating a non-compacted layer of fibres containing heat softenable adhesive powders or fibres including biocomponent polymer fibres until bonding occurs.

The lofty non-woven fabric used in the invention will normally comprise resilient fibres to render the cover layer resilient and therefore resilient to permanent collapse in use. Suitable resilient fibres include hydrophobic resilient fibres such as high density polyethylene, polypropylene, polyester and polyamide fibres and mixtures thereof.

Lofty non-woven fabrics for use in the invention can suitably have a dry bulk density of less than 0.1g/cc and can preferably have a dry bulk density of less than 0.05g/cc for example 0.02 to 0.04g/cc. Such lofty non-woven fabric layers can suitably have a thickness of 2 to 6mm more suitably a thickness of 2.5 to 5mm and can preferably have a thickness of 3 to 4mm.

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Lofty non-woven fabric of such bulk density and thickness and which also comprise resilient relatively hydrophobic fibres are commercially available.

Favoured lofty non-woven fabrics of this type are those which have been thermally bonded. An apt lofty non-woven fabric for use in the invention is known as Soffban available from Smith & Nephew which comprises thermally bonded polyester fibres and a thickness of .3 to 4mm, a bulk density of approximately 0.02g/cc and a weight per unit area of 70g/m<sup>2</sup>.

Suitable lofty non-woven fabrics can also include the bulked or expanded form of precursor compressed non-woven fabrics.

Favoured precursor compressed non-woven fabrics for forming the lofted non-woven fabric used in the invention are those which expansion have the suitable or preferred bulk densities and thickness described hereinbefore with reference to the lofty non-woven fabric.

Favoured compressed non-woven fabric materials for forming the lofty non-woven fabrics used in the invention comprise a thermally bonded polyester fibres and are known as Ultraloft available from Bonar Cavelle

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Limited. Apt non-woven fabric of this type are Ultraloft P 50 - 252 20 and P 70 252 20 which have a weight per unit area of  $50\text{g/m}^2$  and  $70\text{g/m}^2$  respectively.

Such apt non-woven fabrics have a thickness of 0.3 to 0.4mm and are capable of expanding to a thickness of 3 to 4mm when subjected to a temperature of approximately  $150^\circ\text{C}$  to provide lofty non-woven fabric which has a bulk density of 0.014 to 0.02g/cc.

In one aspect of the invention the cover layer comprises a longitudinal corrugated layer of lofty non-woven fabric.

Such a corrugated layer of lofty non-woven fabric of the cover layer can have a uniform thickness and density. It is preferred, however, that the corrugations at the longitudinal depressed portions of the cover layer comprise compressed areas which are thinner and have a higher density than the corrugations at the longitudinal raised portions of the cover layer. Such compressed areas can stabilise the corrugated form of the layer, and can also advantageously provide the cover layer with longitudinal depressed portions which have a high rate of fluid penetration.

The corrugations in the lofty non-woven fabric

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layer at raised portions of the cover layer can have an open form. It is preferred, however, that the corrugations have a closed form so that the non-woven fabric layer has an upright folded configuration at these raised portions of the cover layer. Such a folded configuration of the non-woven fabric layer provides the cover layer at raised portions thereof with a greater thickness and a more compact form to resist deformation under load than a cover layer which comprises similar lofty non-woven fabric layer with open corrugations at these raised portions.

The corrugated layer of lofted non-woven fabric of the cover layer can suitably have a thickness of 3mm to 10mm and can preferably have a thickness of 5mm to 8mm. The relatively thick and bulky nature of the lofty non-woven fabric layer renders the cover layer of hygienic absorbent product of the invention relatively softer and more resistant to the "wet-back" of absorbed fluid in absorbent layer through the cover layer than the relatively thin cover layer sheet used in conventional hygienic absorbent products.

Such a cover layer of the invention can optionally also comprise an additional liquid pervious top sheet over the corrugated layer of lofty non-woven fabric. This additional layer which is preferably also

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corrugated to conform and make good surface contact with the corrugated layer, will be sufficiently open not to interfere with passage of liquids to the corrugated layer.

Such a top sheet can provide the cover layer with a soft body compatible surface.

Suitable liquid pervious top sheets for the cover layer used in the invention include those used in conventional hygienic absorbent products. Favoured top sheets are non-woven fabrics or nets which comprise fibres or strands a hydrophobic polymer such as polypropylene, high density polyethylene or polyester. Such top sheets normally have a weight per unit area of 5 to 25g/m<sup>2</sup>. An apt top sheet for the cover layer used in the invention is a thermally bonded polypropylene fibre fabric known as Caravan PPS-MED available from Caravan GMBH which has a weight per unit area of 15 to 20g/m<sup>2</sup>.

Such liquid pervious sheets may be corrugated separately or during the formation of corrugated lofted non-woven as will be described hereinafter.

The cover layer used in the invention, however, can comprise a corrugated layer of lofty non-woven

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fabric which has a compacted top surface layer to render the cover layer more comfortable to the body.

The cover layer used in the invention may also comprise a liquid pervious bottom sheet which is bonded at the longitudinal depressed portions thereof to the corrugated layer of lofty non-woven fabric. Such a bonded liquid pervious bottom sheet can advantageously stabilise the corrugated form of the layer of lofty non-woven fabric.

Suitable and favoured liquid pervious bottom sheet for the cover layer used in the invention can be the same as those described hereinbefore in relation to liquid pervious top sheets.

It is preferred, however, that the bottom sheet has an open structure for example a net structure and is also capable of being heat bonded to the lofty non-woven fabric layer. An apt bottom sheet for the cover layer comprises a net of high density polyethylene known as net 909 ref.. X540 available from Smith & Nephew Plastics Limited.

In another aspect of the invention the cover layer comprises a longitudinal corrugated liquid pervious top sheet and strips of lofty non-woven fabric

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positioned under the top sheet and within the longitudinal raised portions of the cover layer.

Suitably lofty non-woven fabrics and liquid pervious top sheets for use in the cover layer are those described hereinbefore with reference to cover layers comprising a corrugated lofty non-woven fabric which comprises a single strip of lofty non-woven fabric. The strip, however, may have a folded configuration within the raised portion of the cover layer. A favoured strip of this type is a flat strip with a single fold which is preferably in an upright position within the raised portion. Preferred cover sheets for use in the invention thus comprise longitudinal raised portions which comprise a flat strip of lofty non-woven fabric which has a substantially upright folded configuration.

The use of such folded strips in the cover layer can advantageously provide the longitudinal raised portions thereof with greater resistance to permanent deformation under load than a similar by unfolded flat strip.

The strip or combination of strips of lofty non-woven fabric within a longitudinal raised portion of the cover layer used in the invention is preferably



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adapted in size and shape to occupy a substantial proportion of the space within such a portion. Favoured strips or combination of strips of lofty non-woven fabric within the cover layer used in the invention therefore have a thickness and width similar to that of the longitudinal raised portions of the cover layer.

Such a cover layer used in the invention preferably comprises a liquid pervious bottom sheet which is bonded at the longitudinal depressed portions thereof to the corrugated top sheet. Such a bonded liquid pervious bottom sheet can advantageously stabilise the corrugated form of the top sheet and also maintain the strips of lofty non-woven fabric in position within the raised portions of the lower layer.

Suitable and favoured liquid pervious bottom sheet for the cover layer used in the invention can be the same as those described hereinbefore in relation to cover layers having a corrugated lofty non-woven fabric.

The longitudinal raised portions of the cover layer used in the invention can suitably have a thickness of 3mm to 10mm and can preferably have a thickness of 5mm to 8mm. The width of these

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longitudinal raised portions can suitably be 3mm to 15mm and can preferably be width of 5mm to 10mm.

The longitudinal raised portions of the cover layer are separated by longitudinal depressed portions thereof. Such longitudinal depressed portions can suitably have a width of 0.5 to 10mm and can preferably have a width of 1 to 5mm for example a width of 2mm. The longitudinal depressed portions will be usually relatively thinner than the longitudinal raised portions to promote rapid transmission of fluid through the cover layer at these regions.

The cover layer used in the invention will normally have at least 4 longitudinal raised portions. A cover layer with 6 to 12 longitudinal raised portions has been found suitable for a female stress incontinence pad of the invention. The cover layer can suitably have 0.5 to 2.5 longitudinal raised portions per cm and can preferably have 0.75 to 2 longitudinal raised portions per cm width of the absorbent product. The longitudinal raised portions of the cover layer can have a uniform width and thickness. The longitudinal raised portions adjacent to the longitudinal sides of the absorbent product, however, can advantageously have a greater thickness and/or width than the remaining raised portions to inhibit the spread of fluid to the

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sides of the absorbent product. Such longitudinal side raised portions can advantageously be provided with a fluid impervious layer such as film or coating to inhibit leakage from the sides of the absorbent product.

The absorbent layer of the hygienic absorbent product of the invention can comprise any of the absorbent materials used in conventional hygienic absorbent product. It is preferred, however, that the absorbent material has a relatively fast fluid absorbency rate to render the absorbent layer capable of absorbing rapid discharge of fluid. Favoured absorbent materials for the absorbent layer comprise cellulosic fibres such as comminuted wood pulp fibres and hydrophilic open cell polymer foams such as hydrophilic polyurethane foams.

The absorbent layer can aptly be in the form of a pad for example a planar pad which is adapted in size and shape to conform to the perineal region of the body. The pad, however, may have longitudinal concave shape as will be explained hereinafter.

The hygienic absorbent product of the invention can also comprise a superabsorbent polymer. The superabsorbent polymer can be in a particulate form for example in a powder or fibre form which is distributed

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above, below or within the absorbent layer. It is preferred, however, the superabsorbent polymer is in the form of layer. Such a layer can be positioned above, or within the absorbent layer but is preferably positioned below the absorbent layer.

The superabsorbent polymer can advantageously provide the superabsorbent product of the invention with increased absorbent capacity without a substantial increasing in the thickness of the product.

Suitable superabsorbent polymers in powder, fibre or layer form for use in the invention include any of those used in conventional hygienic absorbent products.

Favoured superabsorbent polymers for use in the hygienic absorbent product of the invention comprise a salt of a cross-linked polyacrylic acid. An apt polymer of this type is known as Favour SAB922 which is available in granular form from Chemische Fabrick Stockhausen GmbH.

The hygienic absorbent product of the invention will normally comprise a liquid impervious barrier layer over the non-body facing side of the absorbent layer. The barrier layer can be a flexible film such as thin low density polyethylene film. In favoured

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hygienic absorbent products of the invention the flexible barrier film also covers the longitudinal sides and optionally also the ends of the absorbent layer to inhibit leakage therefrom.

The barrier layer, however, can comprise a liquid impervious moulded plastics sheet material which for example is stiff enough to maintain the absorbent product in a preformed shape. Such a moulded plastics sheet material can preferably also be resilient to enable the absorbent product to be conformable but substantially resistant to permanent deformation in use.

Suitable liquid impervious plastics sheet materials for the barrier layer include thermo formable sheets of closed cell foams such low density polyethylene foams or ethylene - vinyl - acetate copolymer foams.

The moulded barrier plastics sheet material can conveniently be in the form of a dish or shell of suitable shape for example a longitudinal concave shape to enable the absorbent product of the invention in use to conform to the perineal area of the body. Such preshaped hygienic absorbent products have the advantage that transverse creasing of the cover layer

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is minimised in use.

The cover layer of the hygienic absorbent product of the invention will normally contact the absorbent layer to ensure rapid absorption of the body fluid discharge after it has penetrated the cover layer. The cover layer can be conveniently attached to the barrier layer by a suitable means for example by heat sealing around the peripheral edge of the product.

The hygienic absorbent product of the invention can be a sanitary towel, a diaper, an incontinence pad or alike absorbent pad. A preferred hygienic absorbent product of the invention is an incontinence pad and in particular an incontinence pad for use for the female stress incontinent.

Female stress incontinence pads of the invention will normally have an absorbent capacity to absorb at least 50ml, desirably 75ml and preferably at least 100ml of urine. Such pads will be capable of coping with the rapid discharges of urine normally encountered with female stress incontinence, which it is believed can be up to 20ml in volume and delivered at rates of up to 20ml/sec.

In another aspect the invention provides a

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process for forming the hygienic absorbent product of the invention which comprises covering one side of an absorbent layer with a liquid pervious, substantially non-absorbent longitudinally ribbed liquid distribution member wherein the ribs of the distribution member comprise a lofty non-woven fabric.

In a further aspect the invention provides a process of forming the hygienic product of the invention which process comprises covering the body facing side of an absorbent layer with a non-absorbent liquid pervious cover layer wherein the cover layer comprises a longitudinal corrugated lofty non-woven fabric.

The materials used in the process can be the same as hereinbefore described in relation to the hygienic absorbent product of the invention.

The corrugated lofty non-woven fabric of the cover layer can be formed by any conventional corrugating method such as moulding, embossing stamping or a folding method. It is preferably however that the method used for forming the corrugated layer forms a stabilised corrugated layer. Such a stabilised layer can conveniently be formed by a method which comprises compressing for example in a mould portions of the

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lofty non-woven fabric to form thinned longitudinal depressed portions in the layer.

The non-woven fabric used to form the corrugated layer of lofty non-woven fabric used in the invention may be lofty material or precursor material which can be lofted by heating. A convenient method of forming the corrugated layers of lofty non-woven fabric thus comprises placing a layer of lofty material or precursor material against the surface a mould containing longitudinal grooves separated by flat areas and subjecting the mould to heat and pressure to compress the portions of the layer against the flat areas and if necessary to allow the precursor material to expand into a lofty state within the groove.

When the cover layer also comprises a top sheet it is convenient to form the two layers or sheets into a composite sheet and corrugate the composite sheet. When the cover layer also comprises a bottom layer of open material such a net to stabilise the corrugated form of non-woven fabric layer this layer can conveniently be attached for example by heat sealing to the layer during or after corrugation.

In yet a further aspect the invention provides a process of forming the hygienic absorbent product of



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the invention which process comprises a covering on the body facing side of an absorbent layer with a liquid pervious, non-absorbent cover layer wherein the cover layer has longitudinal raised portions separated by longitudinal depressed portions and comprises a corrugated liquid pervious top sheet and strips of lofty non-woven fabric positioned under the top sheet and within the longitudinal raised portions of the cover layer.

The liquid pervious top sheet can be corrugated by any corrugating method such as moulding, embossing, stamping or folding method. If is preferred, however, that the corrugated top sheet is corrugated by a moulding method in which the top sheet is placed against a mould having the appropriate surface profile and moulded under heat and pressure.

The corrugated top sheet can then be combined with the strips of lofty non-woven fabric or precursor material to form the cover layer. It is preferred, however, to corrugate the top sheet during the process of forming the cover layer. A convenient method of forming the cover layer thus comprises placing the top sheet against the surface of the mould having longitudinal grooves separated by flat areas and then inserting the lofty non-woven fabric strips or

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precursor material within the grooves and subjecting the mould to heat and pressure to mould the top sheet and if necessary to allow the precursor material to expand to a lofty state within the grooves. An optional bottom layer of liquid precursor material such as a plastics net can be conveniently attached to the top sheet of the cover layer during the above mentioned moulding method. Such a bottom layer could also be attached to the top sheet after corrugation by for example heat-sealing.

The hygienic absorbent product of the invention will normally comprise a liquid impervious barrier layer which covers the non-body facing side preferably also the longitudinal sides of the absorbent layer. In preferred processes of the invention the absorbent layer is placed between the barrier layer and the cover layer and the cover and barrier layers are sealed around the peripheral edge of absorbent layer to form an enclosure therefor.

The sealing method can be a conventional adhesive or heat sealing method.

A super absorbent polymer layer if required can be placed against or within the absorbent layer in a preliminary process.

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The invention will now be illustrated by reference to the following in which:

Figure 1 is perspective view of one embodiment of the invention

Figure 2 is a cross section of Figure 1 along line A - A

Figure 3 is a longitudinal cross section of a second embodiment of the invention

Figure 4 is a cross section similar to that of Figure 2 of a third embodiment of the invention.

Figs 1 and 2 show a substantially rectangular hygienic absorbent product 1 of the invention which comprises an absorbent layer 2 in the form of a planar pad and a liquid pervious cover layer 3 on the body facing side of the absorbent layer 2.

The cover layer 3 has longitudinal raised portions 5 and comprises a corrugated lofty non-woven fabric 6 and also corrugated top sheet 7 which is superimposed on lofty non-woven fabric 6. Lofted non-woven fabric 6 has thinner areas 8 formed by

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compression at depressed portion 5 of the cover layer 3 and folded thicker areas 9 at raised portions 4 of the cover layer 3 which occupy a major proportion of the space within these raised portions.

The hygienic absorbent product shown in Figs 1 and 2 has a liquid impervious barrier layer of flexible film 10 covering the body facing side of the absorbent layer 2.

The cover layer 3 shown in Figs 1 and 2 lies in contact with absorbent layer 2 and is sealed to the barrier film layer 10 around the peripheral edge 11 of absorbent layer 2 to form an enclosure therefor.

Fig 3 shows a preformed longitudinal concave absorbent pad 12 of the invention which comprises a liquid impervious barrier layer 13 of a thermoformed resilient closed cell foam sheet which is sufficiently stiff to maintain the curved shape of the pad 12. The barrier layer 13 has a dish portion 14 which contains absorbent layer 2 and a peripheral edge lip 15 which is sealed to the peripheral edge of cover layer 3.

Fig 4 shows a cross-section of a substantially rectangular hygienic absorbent product 21 similar to that of Figure 1 which comprises an absorbent layer 22

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in the form of a planar pad and a liquid pervious cover layer 23 on the body facing side of the absorbent layer 22.

The cover layer 23 has longitudinal raised portions 24 separated by longitudinal depressed portions 25 and corrugated liquid pervious top sheet 26 and strips 27 of lofty non-woven fabric positioned under top sheet 26 and within the longitudinal raised portions 24 of the cover layer. Cover layer 23 has individual strips 27 of lofty non-woven fabric which have an upright folded configuration and occupy major proportion of the space within the raised portions 24 of the cover layer 23. Cover layer 23 has a bottom sheet 28 of liquid pervious material which is bonded to the corrugated top sheet 26 at longitudinal depressed portions of cover layer 23 to maintain the strips 27 in position.

The hygienic absorbent product 21 shown in Figure 4 has a liquid impervious barrier layer of flexible film 29 covering the body facing side of the absorbent layer 22.

The cover layer 23 lies in contact with absorbent layer 22 and is sealed to the barrier film layer 29 around the peripheral edge 30 of absorbent layer 22 to

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form an enclosure therefor.

In use rapid discharges of body fluid such as urine, for example at a rate and in an amount associated with female stress incontinence, onto the cover layer 3 or 23 of absorbent pad 1, 12 or 21 may either rapidly penetrate through cover layer 3 or 23 into absorbent layer 2 or 22 or before penetration therethrough may be distributed lengthwise of the pad along longitudinal depressed portions 5 or 25 and/or be temporarily stored within the raised longitudinal portions 4 or 24 of the cover layer. Furthermore, fluid leakage to the sides of the pad is also inhibited by the longitudinal raised portions 4 or 24 which resist transverse fluid spread in the width direction of the pad.

The cover layer of hygienic absorbent products of the invention therefore has fluid distribution, temporary storage and leakage prevention means for excess fluid which are not present in the cover layer of conventional absorbent pads and which thus render hygienic absorbent products of the invention capable of coping with rapid discharges of body fluid.

In addition the greater thickness of the cover layer in hygienic absorbent products of the invention

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over that of the cover layer of conventional products provide better separation between absorbent layer and the surface of the product in use and therefore reduces the amount of wet-back of absorbed fluid from the absorbent layer to the surface of such products in use.

The invention will now be illustrated by reference to the following examples:

Example 1

A rectangular absorbent pad of the invention was formed by placing a rectangular absorbent layer (length 200mm, width 80mm, thickness 10mm) of comminuted wood pulp fibres between a rectangular liquid pervious cover layer of slightly larger size and a rectangular liquid impervious barrier layer of a rectangular (length 220mm, width 104mm) low density polyethylene film (22 $\mu$ m thick) and heat sealing the cover and barrier layers together at a peripheral edge seal to enclose the absorbent layer within the sealed layers. The absorbent pad so formed had a barrier layer which covered the sides and ends of absorbent layer. The cover layer used in the absorbent pad consisted of corrugated top sheet of thermally bonded propylene fibres (Corovin PPS-MED) superimposed on a similarly corrugated lofty non-woven fabric of bonded polyester

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fibres. The cover layer had 9 longitudinal raised portions (width 6mm) separated by longitudinal depressed portions (width 2mm) and a thickness at the raised portions of 6mm and a thickness at the base of the depressed portions of approximately 1mm. The lofty non-woven fabric within the raised portions of the cover layer was in a upright folded configuration.

The cover layer of the absorbent pad was formed by lining the surface of a mould plate containing nine longitudinal rounded grooves (width 6mm, depth 6mm) separated by flat areas (width 2mm) with the top sheet and the non-woven fabric (Ultrasoft p70-252:20), which can be lofted by heat, and applying heat and pressure to the layers by means of a flat plate in a press heated to 150°C to expand the non-woven fabric in the grooves and to constrain the non-woven fabric at the flat areas.

The absorbent pad of this example was found to be suitable for use as a female stress incontinence pad.

#### Example 2

An absorbent pad having a preformed longitudinal concave shape was formed in a similar manner to the absorbent pad of Example 1 except that a relatively



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stiff by resilient barrier of the thermo-formed low density polyethylene closed cell foam sheet (thickness 2mm) was used instead of the barrier film layer of Example 1. The barrier layer had a longitudinal concave rectangular dish shape for containing the absorbent layer a peripheral edge lip for sealing to the cover layer.

The absorbent pad of this example was found to be suitable for use a female stress incontinence pad.

### Example 3

A rectangular absorbent pad of the invention was formed in the same manner as Example 1 except that the cover layer used in the absorbent pad consisted of corrugated top sheet of thermally bonded polypropylene fibres (Corovin PPS-MED), a bottom sheet a high density polyethylene net (net 909 ref. X540) and intermediate strips of lofted non-woven fabric of bonded polyester fibres positioned within the longitudinal raised portions of the cover layer.

The cover layer had 9 longitudinal raised portions (width 6mm) separated by longitudinal depressed portions (width 2mm) and a thickness at the raised portions of 6mm and a thickness at the base of

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the depressed portions of approximately 1mm. The lofty non-woven fabric strips within the raised portions of the cover layer were in a upright folded configuration.

The cover layer of the absorbent pad was formed by lining the surface of mould plate containing nine longitudinal rounded grooves (width 6mm, depth 6mm) separated by flat areas (width 2mm) with the top sheet inserting strips (width 12mm) of precursor lofty non-woven fabric (Ultraloft p70-252:20) adjacent the topsheet within the grooves, placing the plastic net over the mould place and applying heat and pressure to the layers by means of a flat plate in a press heated to 150°C to expand the precursor lofty non-woven fabric in the grooves to corrugate the top sheet and to bond the net to the flat corrugated areas of the top sheet.

The absorbent pad of this example was found to be suitable for use as a female stress incontinence pad.

#### Example 4

An absorbent pad having a preformed longitudinal concave shape was formed in a similar manner to the absorbent pad of Example 3 except that a relatively stiff by resilient barrier layer of the thermo-formed

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low density polyethylene closed cell foam sheet (thickness 2mm) was used instead of the barrier film layer of Example 3. The barrier layer had a longitudinal concave rectangular dish shape for containing the absorbent layer and a peripheral edge lip for sealing to the cover layer.

The absorbent pad of this example was found to be suitable for use as a female stress incontinence pad.

#### Absorbency Test

Absorbent pads of Examples 1 and 3 and a comparison commercially available incontinence pad (Regard Light incontinence pad available from Smith & Nephew Consumer Products) were tested for their ability to cope with rapid discharge of fluid. The absorbent layer of the commercially available pad was similar to but had twice the thickness of the absorbent layer of the absorbent pad of Example 1. The commercially available pad had a conventional cover layer in the form of net wrapper which enclosed the absorbent layer and a barrier film which covered the bottom and longitudinal sides of the absorbent layer.

In the test the test absorbent pad was held in

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place by an elasticated bandage against a curved perspex block to simulate an absorbent pad in use. Simulated urine was fed from a delivery tube through a hole in the centre of the perspex block onto the pad. In the test three fluid discharges of 20ml were fed at a rate of 20mls/sec. onto the pad with an interval of 10 sec. between discharges. The synthetic urine used in the test was an aqueous solution containing urea (19.4g) sodium chloride (8g), magnesium sulphate (1g) calcium chloride (10.0g) and distilled water (971g).

The test showed that absorbent pads of the invention readily accepted the discharges of fluid and no leakage of the fluid to the sides of the pad occurred. It was observed that during the test some flow of fluid along the longitudinal depressed portions of cover layer occurred. In contrast the test also showed that the comparison pad after initially absorbing some fluid, allowed excess fluid to either leak via transverse creases to the sides of pad or fill up the hole in the perspex block and overflow the test apparatus. This leakage or overflowing occurred after each discharge.

The test thus indicates that the absorbent pads of Example 1 and 3 which employ the cover layer used in the invention is suitable for coping with rapid

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discharges of body fluid such as urine in an amount and at a rate which may occur with female stress incontinence and that the commercially available absorbent pad which employs a conventional cover layer would not be suitable for this purpose.

#### Fluid Wet-back Test

Absorbent pads made according to Examples 1 and 2 were subjected to a fluid wet-back test which was carried out in the following manner:

A 2.376kg flat weight (diameter 2.2cm) was placed on the towel and left for 2 mins and then removed. 5ml of 1% saline solution coloured with green dye was delivered onto the centre of the towel by means of a syringe pump at a rate of 1ml/min and at a height of 1cm above the towel surface. After 10 secs a pre-weighed stack of filter papers (Whatman No. 54 filter papers) was placed over the wetted area of the towel and the flat weight placed on the filter papers. After 1 minute, the filter papers and weight were removed and the filter papers weighed. The wet-back expressed as grams of fluid was then calculated from the difference in weight between the wet and dry filter papers. The results are the average of tests on two samples.

Results

<u>Sample</u>	<u>Fluid wet-back</u>
Sanitary towels of Examples 1 and 2	0.2
Comparison absorbent pad	1.5

The comparison absorbent pad was the same as the commercially available incontinence pad used in the absorbency test.

The results show that absorbent pads of the invention having a cover layer fabric or strips of lofty non-woven fabric under a corrugated top sheet have a much reduced fluid wet-back when compared to that of prior art absorbent pads having conventional cover layer.

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CLAIMS

1. A hygienic absorbent product including an absorbent layer, and a liquid pervious substantially non-absorbent, longitudinally distribution member adjacent the body facing side of the absorbent layer wherein the ribs of the distribution member comprise a lofty non-woven fabric.
2. A product as claimed in claim 1 in which the distribution member comprises a longitudinal corrugated layer having raised portions separated by depressed portions.
3. A product as claimed in claim 2 in which the corrugated layer comprises a sheet of a lofty non-woven fabric.
4. A product as claimed in any one of the preceding claims in which the distribution member further comprises a liquid pervious top sheet.
5. A product as claimed in claim 4 in which the distribution member comprises longitudinally disposed strips of lofty non-woven fabric which are positioned under the top sheet and within the longitudinal raised portions of the cover layer.

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6. A product as claimed in claim 5 in which the strips have an upright folded configuration.

7. A product as claimed in any one of the preceding claims comprising a liquid pervious bottom sheet intermediate the distribution member and the absorbent layer.

8. A product as claimed in claim 7 in which the bottom sheet comprises a thermoplastic net.

9. A product as claimed in any of claims 1 to 8 in which the distribution member has a thickness of 3 to 10mm.

10. A product as claimed in any of claims 1 to 9 in which the lofty non-woven fabric comprises thermally bonded polyester fibres.

11. A product as claimed in any of claims 1 to 10 which comprises a liquid impervious barrier layer over the non-body facing side of the absorbent layer.

12. A product as claimed in claim 11 in which the barrier layer comprises a moulded polymer foam sheet.



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13. A product as claimed in any of claims 1 to 12 in which the absorbent layer comprises a superabsorbent polymer.

14. A product as claimed in any of claims 1 to 13 which is an incontinence pad.

15. A process of forming a hygienic absorbent pad which comprises covering one side of an absorbent layer with a liquid pervious substantially non-absorbent longitudinally ribbed layer wherein the ribs of the layer comprise a lofty non-woven fabric.

16. A process as claimed in claim 15 in which the ribbed layer comprises a longitudinal corrugated lofty non-woven fabric.

17. A process as claimed in claim 15 in which the ribbed layer comprises corrugated liquid pervious top sheet having one or more strips of lofty non-woven fabric under the raised portions thereof.

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FIG. 1.

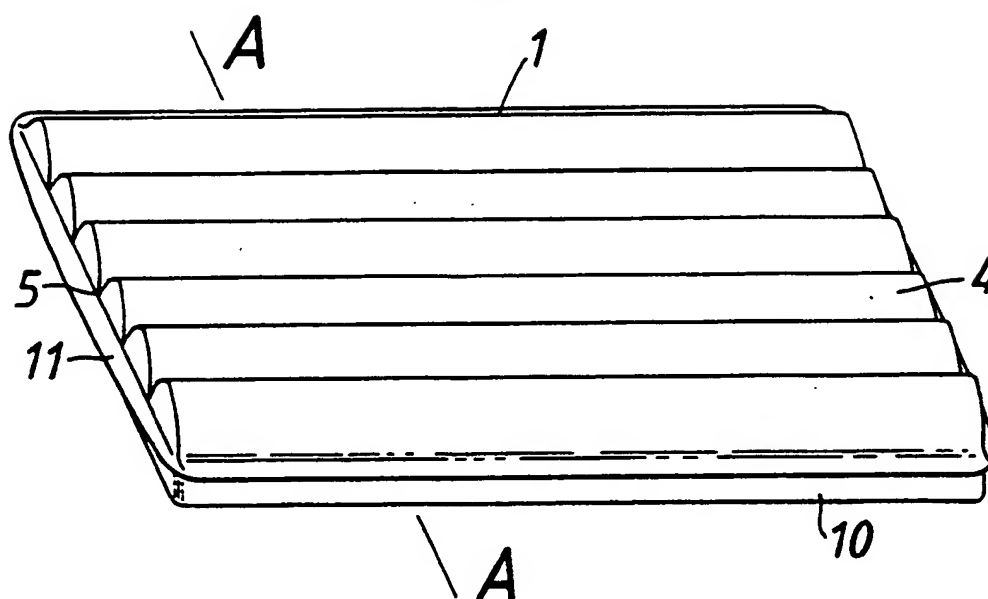
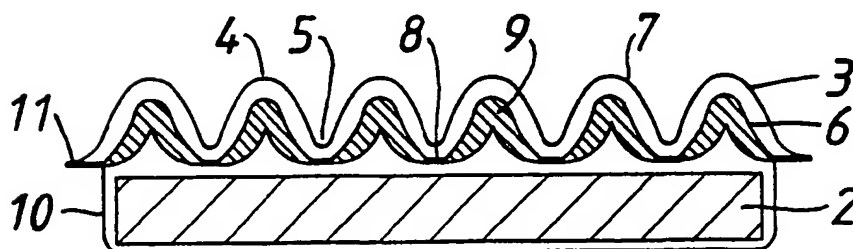


FIG. 2.



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FIG. 3.

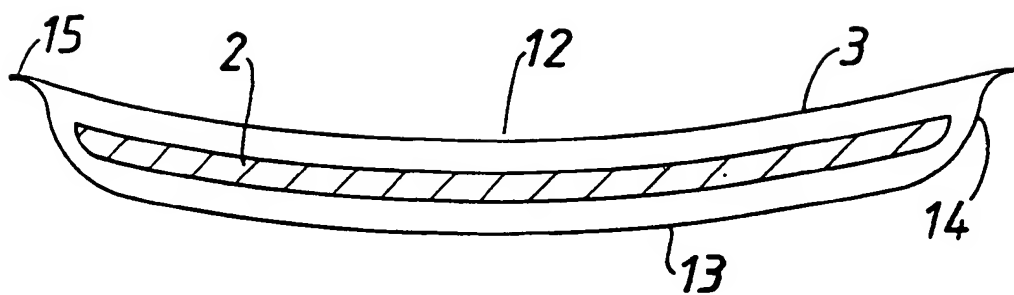
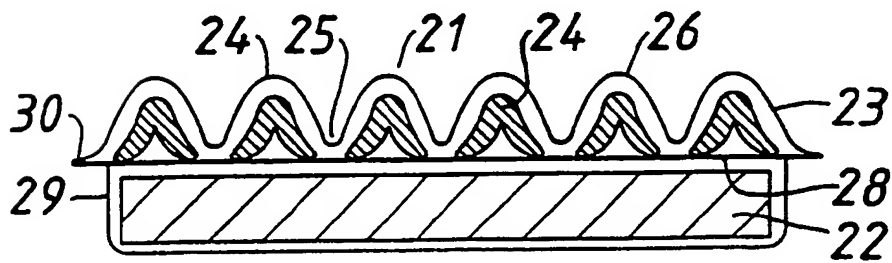


FIG. 4.



# INTERNATIONAL SEARCH REPORT

International Application No PCT/GB 91/00117

<b>I. CLASSIFICATION OF SUBJECT MATTER</b> (if several classification symbols apply, indicate all) <sup>6</sup> According to International Patent Classification (IPC) or to both National Classification and IPC IPC5: A 61 F 13/15, 13/50		
<b>II. FIELDS SEARCHED</b> <div style="text-align: right; margin-right: 100px;">Minimum Documentation Searched<sup>7</sup></div>		
Classification System	Classification Symbols	
IPC5	A 61 F	
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in Fields Searched <sup>8</sup>		
<b>III. DOCUMENTS CONSIDERED TO BE RELEVANT<sup>9</sup></b>		
Category *	Citation of Document, <sup>11</sup> with indication, where appropriate, of the relevant passages <sup>12</sup>	Relevant to Claim No. <sup>13</sup>
X	US, A, 4578070 (DENNIS C. HOLTMAN) 25 March 1986, see the whole document	1-4,6-16
Y	--	5,17
X	US, A, 4059114 (SHIRLEY T. RICHARDS) 22 November 1977, see the whole document	1
X	US, A, 4636209 (FREDERICH O. LASSEN) 13 January 1987, see the whole document	1
	--	
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p><sup>a</sup> Special categories of cited documents: <sup>10</sup></p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </div> <div style="width: 45%;"> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance, the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance, the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"&amp;" document member of the same patent family</p> </div> </div>		
<b>IV. CERTIFICATION</b>		
Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report	
30th April 1991	28.05.91	
International Searching Authority	Signature of Authorized Officer	
EUROPEAN PATENT OFFICE	<div style="display: flex; align-items: center;"> <div style="border: 1px solid black; padding: 2px 5px; margin-right: 10px;">M. PEIS</div> <div style="font-family: cursive; font-size: 1.2em;">M. Peis</div> </div>	

III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)		
Category *	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No
Y	US, A, 4753644 (ALAN M. COTTENDEN) 28 June 1988, see figure 2  --	5,17
A	GB, A, 2023067 (COLGATE-PALMOLIVE COMPANY) 28 December 1979, see the whole document  --  -----	1-17

ANNEX TO THE INTERNATIONAL SEARCH REPORT  
ON INTERNATIONAL PATENT APPLICATION NO. PCT/GB 91/00117

SA 43975

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report. The members are as contained in the European Patent Office EDP file on 23/03/91. The European Patent office is in no way liable for these particulars which are merely given for the purpose of information.

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